

REMARKS

Claims 1-15 are currently active.

Antecedent support for the limitations regarding "the two ends," and the "coating" in the claims can be found on page 10, line 10 and page 9, line 26, respectively.

The Examiner has rejected Claims 1-15 under 35 U.S.C. §102 as being anticipated by German Patent Application DE 40 14 153 A1.

Applicant provides below a detailed discussion that demonstrates that from German Patent Application DIS 40 14 153 A1, and especially its Figure 2, one of ordinary skill in the art following its teachings would not obtain a uniform heated filter.

A detailed examination of the German Patent Application reveals a critical flaw that makes it clearly different from the claimed method and apparatus of the above-identified patent application. Compare Figure 2 of the German Application with Figure 1 of the above-identified patent application and Claims 1, 14 and 15. While both figures show two microwave sources, the German Figure 2 shows the microwave inputs *directly into the particulate filter* along its sides. This is clearly the intent of the inventors, as indicated by the

wording of their claim 15, which states that "the at least one microwave tube (20) is disposed *laterally spaced apart from the filter body housing* (10) and communicates via a channel (30) with the filter body housing (10) for imposing microwave radiation *on* the exhaust gas filter body (16)."

This method of microwave heating **will not produce a uniform heating distribution**, because when the microwave radiation is imposed directly on the filter body along its sides, that part of the body nearest to the source, or microwave port, always heats preferentially. Applicants have proved this with repeated heating trials in applicants' laboratory. This is the reason that the two microwave sources shown in applicants' Figure 1 heat the filter from each end of the two ends of the filter, as claimed.

Thus, it is not sufficient to use two microwave sources in order to eliminate the problem of the electromagnetic field intensity being greater in the part of the filter nearest to the microwave port. It is also necessary to ensure that the microwaves do not irradiate the filter from its sides, but instead from each end. The two sources in combination can then provide the uniform heating over the entire filter. The configuration shown in Figure 2 of the German Application is totally inconsistent with the claimed invention and would not provide uniform heating. It is flawed in just the same way as the other previous art which applicants describe in the application. The presence of the second source, as shown in Figure 2 and

described in claim 15, in the German Application *does not address the problem of the electromagnetic field intensity being stronger in the part of the filter nearest the port*, and thus the sides of the filter near the two ports will heat much faster than the rest of the filter, with a high probability of damage to the filter and incomplete regeneration.

Additionally, the claimed invention uses a coated filter. The coating is necessary to achieve uniform heating, irrespective of carbon soot distribution in the filter. Without it, heating is inefficient and at best spotty and localized at places where carbon soot is trapped, thus regeneration efficiency is low. Non-uniform heating causes thermal stresses in the filter, resulting in cracking and destruction of the ceramic material that makes up the filter.

The German Application is one additional piece of prior art that happens to use a second microwave source for the regeneration, but does so in a flawed manner that is both: (1) different from the claimed invention; and (2) does not address the problem of nonuniform heating that the claimed invention addresses and solves. Accordingly, Claims 1-15 are not anticipated by the German application.

In view of the foregoing amendments and remarks, it is respectfully requested that the outstanding rejections and objections to this application be reconsidered and withdrawn, and Claims 1-15, now in this application be allowed.

Respectfully submitted,

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on 10/24/02

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Date

Version with markings to show changes made to the claims

1. A regeneration system comprising:

at least two microwave sources for producing microwaves;

a microwave cavity in communication with the microwave sources to receive the microwaves; and

a particulate filter having two ends disposed in the cavity which is heated by the microwaves in the cavity, the particulate filter coated with a microwave absorbing material for the particulate filter to be uniformly heated by the microwaves, the particulate filter positioned in relation to the microwave sources to receive microwaves at the two ends for the particulate filter to be uniformly heated by the microwaves from each of the two ends from the microwave sources.

14. A regeneration system comprising:

at least one microwave source for producing microwaves;

a microwave cavity having a plurality of ports through which microwaves from the microwave source enter the cavity; and

a particulate filter having two ends disposed in the cavity which is heated by the microwaves, the particulate filter coated with a microwave absorbing material for the particulate filter to be uniformly heated by the microwaves, the particulate filter positioned in relation to the microwave sources to receive microwaves at the two ends for the particulate filter to be uniformly heated by the microwaves from each of the two ends from the microwave sources.

15. A method for regenerating a particulate filter comprising the steps of:

passing exhaust through the particulate filter; and

heating the particulate filter coated with a microwave absorbing material from its two ends [a plurality of directions] with microwaves so the filter is uniformly heated by the microwaves from each of the two ends.